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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/186,973 11/05/98 HEINEN

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TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
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EXAMINER

SHUKLA, R

ART UNIT

PAPER NUMBER

2823

DATE MAILED:

07/05/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/186,973

Applicant(s)

HEINEN ET AL.

Examiner

Ravi B Shukla

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 May 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: _____

DETAILED ACTION

1. This Office Action is in response to a Continued Prosecution Application filed May 17, 2001 which is part of a Divisional Application filed on 11-5-1998.

Claim Rejections-35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 14, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arima et al [USPN. 5,281,151] in view of Khandros et al {USPN. 5,346,861 }.

With respect to claims 14, and 15 Arima et al teach: (See Figs. 1, 2, 3, 4 and 5 columns 6 -9).

A method for the fabrication of semiconductor assembly 15 comprising:
providing a semiconductor wafer 9 having a plurality of integrated circuits, each circuit (6) having a plurality of metal contact pads as electrical entry and exit ports (10, 8, 50)
forming a planar array of solder balls 10 attached to said contact pads of said semiconductor wafer so that each of said contact pads is contacted by one of said solder balls 10 ;
providing an interposer (3) column 6 lines` 65-68 of electrically insulating material having electrically conductive paths (8, 8' Fig. 6) from one surface to the-opposite surface, forming electrical entry and exit ports on said insulating interposer 3;

placing said interposer 3 vertically and in contact with said adhesive substrate 2 ;
providing a polymer film 6 having a plurality of discrete adhesive areas;
providing a plurality of solder balls 10 and 11, one of said solder balls being placed on each of said adhesive areas (See Fig.5).
aligning said polymer film 6 to said interposer 3 so that each of said solder balls is placed into alignment with one of said ports (See Fig. 5) ;
placing said solder balls 10 and 11 in contact with said ports;
applying energy to said semiconductor wafer 9 such that said wafer increases uniformly in temperature and transfers heat to said solder balls, causing the solder balls to reach a liquid state (See column 7 lines 19-24). Removing said energy such that said solder balls 10 cool and harden, forming physical bonds between said solder balls 10 and said ports 11 and 12;
removing said polymer film 6 ; and separating the resulting composite structure into discrete chips (column 7 lines 19-40).

With respect to claim 17 Arima shows all of the method according to Claim 14, Claim 15 and claim 16 wherein said solder balls comprise at least one alloy with a melting temperature compatible with multiple reflow. (See column 10 lines 3-14)

With regards to claim 18 Arima shows all of the method according to Claim 14, Claim 15, and Claim 16, wherein said wafer contact pads, said solder balls, and said interposer ports comprise a combination of materials such that metal interdiffusion is minimized. (See column 10 lines 15 –60).

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With respect to all the claims 14-18 Arima fails to disclose a planar array of solder balls attached to said exit ports of said interposers 2 or 3. Khandros et al teaches in Figs. 9-10 column 12 lines 41-66 formations of electrically conductive solder balls 52' deposited within holes 82. Therefore, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to apply the teaching of Khandros in the method of Arima to form a planarised array of solder balls attached to said exit ports.

Conclusion


4. Any inquiry concerning this communication or earlier communication from the examiner should be directed to Ravi B. Shukla whose telephone number is (703) -306-0210. The examiner can normally be reached on M-F (8.00-5.00).

5. If attempts to reach the examiner are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached at (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722

6. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956

rbs

June 22, 2001


George Fourson
Primary Examiner
2823